SUBSTITUTE SPECIFICATION
VERSION WITH MARKINGS TO SHOW CHANGES MADE

LATCH MECHANISM

This application claims priority to PCT application, PCT/GB99/01411, filed 4 May 1999, which itself claims priority to British application, GB 9809640.7, filed 6 May 1998.

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a latch mechanisms for a doors of a vehicles. ~~The invention further relates to vehicles including at least 2 doors, each door incorporating a latch mechanism.~~

[0002] It is known to provide a latch mechanisms on a doors of a vehicles to allow ~~opening~~ locking and ~~closing~~ unlocking of the door. Such latch mechanisms have various modes ~~or~~ of operation, ~~eg~~such as:

[0003] a) a ~~L~~lock mode, wherein operation of an outside door handle does not open the latch mechanism;

[0004] b) a ~~S~~superlocked mode, ~~when in~~ wherein operation of an outside or an inside release lever does not operate the latch mechanism;~~.~~

[0005] c) a ~~C~~child safety mode, wherein operation of an inside release lever does not operate the latch mechanism~~.~~; and

[0006] d) a ~~R~~release mode, wherein the latch mechanism is released ~~via~~ by means other than operation of the inside or outside release levers.

[~~0007~~] Each mode has alternate states, such as: ~~eg~~ locked/unlocked, superlocked/not superlocked, child safety on/off and released/not released.

[0007] ———Typically, each mode requires an individual mechanism to effect the ~~alternative~~ alternate states, with operation of each mechanism being affected either manually or ~~with~~ by an individual power actuator.

~~[0009]~~[0008] In the case of a latch mechanism operated entirely by a power actuators, such as a DC motors, it is also necessary to be able to open a locked door ~~which~~ that has the child safety feature "on" in an emergency ~~situation~~ when actuation of the power actuators is not possible, such as when the keys to the vehicle are not available.

SUMMARY OF THE INVENTION

~~[00010]~~ According to the present invention there is provided a latch mechanism ~~including~~ with a housing~~,~~ and a pawl movably mounted in the housing to release ~~the~~ a latch~~,~~. ~~with a~~At least one of an inside and outside lock link is mounted for movement with the pawl. ~~with t~~The at least one lock link is being movable between a first position at which operation of an associated release ~~means~~ member causes movement of the pawl to release the latch, and a second position at which the operation of the associated release ~~means~~ member does not cause movement of the pawl.

[0009] ———Preferably movement of the at least on lock link between its first and second position is effected by a power actuator.

~~[00012]~~[00010] ~~According to a further~~ Another aspect of the invention ~~there is also provided~~ features a latch mechanism having a set of operating modes~~,~~. e~~E~~ach mode ~~having~~ has alternate states~~,~~: ~~the set including~~ at least one of a lock mode and~~,~~ a super lock mode, and at least one of a child safety mode and a release mode~~,~~. e~~C~~hanging of the latch mechanism between alternate states of each of the at least two modes of the set ~~being~~ is effected by a single power actuator.

[00013][00011] ~~According to a further aspect of the invention t~~There is also provided a latch mechanism having a set of operating modes~~;~~. ~~e~~Each mode ~~having~~ has alternate states~~;~~: ~~the set including~~ a child safety mode and a release mode~~;~~. ~~e~~Changing of the latch mechanism between alternate states of each of the modes ~~being~~ is effected by a single power actuator.

[00014][00012] According to a further aspect of the invention, there is provided a vehicle including a first and second door~~;~~. ~~e~~Each door ~~including~~ includes respective first and second latch mechanisms~~;~~. ~~t~~The first and second latch mechanisms ~~being~~ are substantially the same~~,~~ and ~~being~~ are operable by respective first and second power actuators to give respective first and second sets of operating modes. ~~e~~Each mode ~~having~~ has alternate states~~;~~. ~~e~~Control of the power actuators ~~being~~ is different to provide for different first and second sets of operating modes.

BRIEF DESCRIPTION OF DRAWINGS

[00015][00013] The invention will now be described by way of example only with reference to the accompanying drawings in which;

[00016][00014] ~~Fig.~~Figure 1 is a latch mechanism according to the present invention in a super-locked condition;

[00017][00015] ~~Fig.~~Figure 1~~a~~A is an enlarged view of part of Figure~~.~~ 1;

[00018][00016] ~~Fig.~~Figure 1~~b~~B is a schematic view in the direction of arrow A of Figure~~.~~ 1;

[00019][00017] ~~Fig.~~Figure 2 is the latch mechanism of Figure~~.~~ 1 in a locked position with child safety "on";

[00020][00018] ~~Fig.~~Figure 3 is the latch mechanism of Figure~~.~~ 1 in an unlocked condition with the child safety "on";

~~[00021]~~[00019] ~~Fig.~~Figure 4 is the latch mechanism of Figure~~:~~ 1 in a locked condition with the child safety "off";

~~[00022]~~[00020] ~~Fig.~~Figure 5 is the latch mechanism of Figure~~:~~ 1 in an unlocked position with the child safety "off"; and

~~[00023]~~[00021] ~~Fig.~~Figure 6 is a latch mechanism of Figure~~:~~ 1 in a release position.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

~~[00024]~~ With reference to Figures 1-6 there is shown a latch mechanism 10 ~~including~~ having a body 11, which supports various components of the latch mechanism 10 as indicated below.

[00022] ———Latch mechanism 10 further includes a claw 12 pivotally mounted about axis 13 on the body 11. Claw 12 acts to secure an associated door (not shown) in a closed position ~~via a~~ through striker pin 14 attached to the door aperture. Rotation of the claw 12 in an anticlockwise direction about axis 13 when viewing Figure~~:~~ 1 allows release of the striker pin 14, thus enabling opening of the associated door.

~~[00026]~~[00023] The claw 12 is held in a closed position by ~~a~~ pawl 15, only part of which is shown in dotted profile in Figure~~:~~ 1 for clarity. Pawl 15 is pivotally mounted on body 11 and can rotate about axis 16. Claw 12 can be held in a first safety position (not shown) when pawl 15 engages first safety abutment 17.

~~[00027]~~[00024] Pawl lifter 20 is generally flat and lies in a plane parallel to pawl 15, to which it is rotationally secured. When viewing Figure~~:~~ 1 pawl 15 is obscured by pawl lifter 20. Clearly, pawl lifter 20 also rotates about axis 16.

[00028][00025] Viewing Figure 1A, inside lock link 21 and outside lock link 22 are mounted for movement with the pawl 15. In this case, they are each individually pivoted about respective axes 21a and 22a on pawl lifter 20. In this case inside lock link 21 and outside lock link 22 are identical and each have respective cam followers 21b and 22b and release abutments 21c and 22c. Inside lock link 21 and outside lock link 22 are each biased in a clockwise direction when viewing Figure 1 such that the respective cam followers 21b and 22b contact cam 30.

[00029][00026] Cam 30 is capable of rotating independently from pawl lifter 20 about axis 16. Cam 30 has three lobes 31, 32 and 33 and two levers 34 and 35 shown diagrammatically for clarity. Lobes 31, 32, 33 and levers 34 and 35 are all rotationally fast with cam 30. Preferably cam 30 can at least be rotated to the various positions as described below by a power actuator (not shown), such as a DC motor or, preferably, a stepper motor.

[00030][00027] Referring to Figure 1, outside release lever 40 is pivotedly mounted about axis 41. Inside release lever 43 (shown diagrammatically in Figure 1bB) is pivotedly mounted about axis 44.

[00031][00028] Operation of a door latch mechanism is as follows.

[00032][00029] Figure 1 shows the door latch mechanism in a super lock condition. That is to say, operation of the outside release lever 40 or inside release lever 43 does not allow unlatching of the mechanism. Referring to Figures 1 and 1A, in particular, it can be seen that if outside release lever 40 were to be operated by being rotated in a clockwise direction about axis 41, abutment 42 would pass release abutment 22c of outside lock link 22 without contact (note that outside release lever 40 is in the same plane as outside lock link 22). Similarly, inside release lever 43, when operated by being rotated in an anticlockwise direction about axis 44 (when

viewing Figure 1B), would cause abutment 45 to pass release abutment 21c of inside lock link 21 (see especially Figure 1).

[00033][00030] Figure 2 shows the door latch mechanism 10 in a locked position with the child safety feature "on". It will be noted that eCam 30 has been rotated 30 degrees in an anticlockwise direction when compared to Figure 1. However, the inside lock link 21 and outside lock link 22 are in the same position when compared with Figure 1 since because neither of the cam followers 21b or 22b have, at this stage, ridden up any of the lobes 31, 32 or 33 of the cam 30 (see Figure 1A). However, lever 34 has been rotated to a position whereby operation of the inside release lever 43 in an anticlockwise direction, when viewing Figure 1B, would cause abutment 46 to contact lever 34 and rotate cam 30 to the position shown in Figure 3. Note this initial operation of inside release lever 43 does not unlatch the mechanism but only operates to unlock the door (see below). This method of being able to override and open a locked door, which has the child safety "on," is especially important in an emergency situation. whereby aA passer-by can effect access to the inside door handle (eg such as by breaking the door window glass), operate the inside door handle to unlock the door, and then operate the outside door handle to open the door and then remove the child from the car.

[00034][00031] Figure 3 shows the door latch mechanism 10 in an unlocked condition with the child safety feature "on." In this case, the cam 30 has been rotated sufficiently (either by operating the inside release lever when the cam was in the position shown in Figure 2 or by independent rotation of the cam directly, such as eg by a power actuator), such that cam follower 22b has ridden up cam lobe 32, resulting in anticlockwise rotation of outside lock link 22. Thus, when outside release lever 40 is operated, abutment 42 (see Figure 1) contacts release abutment 22c (see Figure 1A) causing to cause the pawl lifter 20 as a whole to rotate

anticlockwise (when viewing Figure 3) and thereby releasing ~~the~~ pawl 15 and allowing ~~the~~ claw 12 to open. Stop 22d limits the anticlockwise rotation of outside lock link 22. Upon release of the outside release lever 40, the pawl lifter 20 (see Figure 1) is biased back to the position as shown in Figure 3 by a spring (not shown). It should also be noted that the inside lock link 21 is in the same position as that shown in Figure 1, ~~t~~Thus operation of the inside release lever 43 does not allow opening of the door.

~~[00035][00032]~~ Figure 4 shows the door latch mechanism 10 (see Figure 3) in a locked condition with the child safety feature "off." ~~It should be noted that the c~~Cam 30 (see Figure 3) has been rotated 90 degrees in an anticlockwise direction when compared with Figure 1. This results in cam follower 22b being situated between cam lobes 32 and 33. ~~t~~Thus, ~~ensuring that~~ operation of outside release lever 40 does not release the latch mechanism. Furthermore, the rotation of the cam 30 (see Figure 3) has caused cam follower 21b (see Figure 1A) to ride up cam lobe 31, causing inside lock link 21 to rotate anticlockwise about axis 21a. Thus, abutment 21c of inside lock link 21 is contacted by abutment 45 (see Figure 1B) of inside release lever 43 (see Figure 2) when ~~it is~~ operated. Referring to Figure 1A, this causes anticlockwise rotation of the ~~pall~~ pawl lifter 20 about axis 16, resulting in unlatching or the door mechanism and allowing the door to be subsequently opened. Stop 21d limits the anticlockwise rotation of inside lock link 21. ~~It should be noted that the o~~Operation of the inside release lever 43 (see Figure 1B) also causes abutment 46 (see Figure 1B) to contact lever 35 (see Figure 1A), causing rotation of cam 30 (see Figure 1A) to the position shown in Figure 5. This prevents a vehicle occupant from inadvertently locking himself out of the vehicle ~~since~~ because opening of the door from the inside automatically unlocks the door, thereby allowing subsequent opening from the outside.

[00036][00033] Figure 5 shows the door latch mechanism 10 (see Figure 5) in an unlocked position with the child safety feature "off." ~~It can be seen that the c~~Cam 30 has been rotated (either by operating the inside release lever when ~~the~~ cam 30 was in the position shown in Figure 4 or by independent rotation of ~~the~~ cam 30 directly, ~~eg~~ such as by a power actuator), such that abutment 22b now rests on lobe 33 allowing operation of the outside release lever 40 to unlatch the latch mechanism as described above. Furthermore, abutment 21b remains in contact with lobe 31, thus ensuring that operation of the inside release lever also unlatches the door mechanism.

~~[00037]~~ Figure 6 shows the door latch mechanism 10 in a released position. This is achieved by rotation of cam 30 in an anticlockwise direction, which allows contact between corresponding lost motion abutments (not shown) on the pawl lifter 20 and cam 30. Such lost motion abutments allow ~~the~~ cam 30 to rotate the pawl lifter 20 to release the door latch mechanism independently of the operation of the outside release lever 40 or ~~the~~ inside release lever 43.

~~———~~Note that only a single cam is required to effect the various modes of operation.

[00034] ~~———~~In further embodiments the inside and outside lock links can be mounted directly on the pawl.